

## Technology Corner

# UDOT Research News

Number 2000-4

## UTAH'S FOG WARNING SYSTEM - "ADVISE"

### Study Conclusions/Results:

- In General, at low visibility, speed variations of vehicles increase.
- Vehicle speed variation decreased by 22% when the ADVISE system was functioning.
- Under adverse visibility, an average 8 mph increase was observed due to factors such as an overall 6 mph general speed increase in the area and reduction of excessively slow drivers during fog events.
- The ADVISE System has a positive effect on traffic provided the system can be maintained such that accurate and reliable information is conveyed to drivers.

### Recommendations Included:

- 1) Integrate System in Advanced Traffic Management System
- 2) Add traffic speed input into control algorithms;
- 3) Continue to evaluate effectiveness.

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### FOG - IS IT A PROBLEM?

Lately, fog has not been a significant issue in Utah nor attracted notable media attention. The presence of fog is a cyclic phenomenon, much like extreme cold or mild winters. Fog has created some treacherous conditions in the past. There were two days at two locations in late 1988 and early 1991 where fog was the contributing environmental element in which a total of 128 vehicles were involved in multi-vehicle incidents. One of the locations is the Interstate 215 south segment between Redwood Road and the I-215/I-15 Interchange in Salt Lake City. This was the location that was selected for the deployment of a fog warning system because of the high daily traffic volumes and the climatological conditions that are conducive to the rapid formation of dense fog. At this location, between December 1995 and March 1998, there were 29 days with recorded fog sufficient to reduce safe stopping distances. In comparison, there were only four recorded low visibility events in the winter of 1999/00.

### ADVISE BACKGROUND

In 1993, UDOT researchers developed a proposal in response to a FHWA solicitation for the "Development of a Prototype Adverse Visibility Warning and Control Systems for Operational Evaluations" UDOT was awarded the project which was to develop a prototype system that would provide real-time warning to motorists during poor visibility situations. The project was named the ADverse Visibility Information System Evaluation or ADVISE. The primary objective of the project was to assess the behavior of drivers during a low visibility event and their response to a warning system. The purpose of this research was to determine if the ADVISE System, reduces the variability in speeds between vehicles and lowers the overall mean vehicle speeds during low visibility events.

A Request for Proposal was issued in 1994 and Rockwell International was selected as the consultant to design and install the fog warning system. The system was to be deployed in two primary stages: 1<sup>st</sup> stage - visibility sensors, 2<sup>nd</sup> stage - changeable message signs. Equipment installation was essentially completed in 1996, but sign and communication equipment failures prevented researchers from collecting useable data. During the winter of 1999/00, several data sets were collected with all components of the system operational. A contract was setup with the University of Utah Traffic Lab to provide analysis of the system effectiveness.

### ADVISE SYSTEM CONFIGURATION

There are four primary components of the ADVISE system: 1) Four visibility sensors, 2) Two variable message signs (VMS), 3) Six traffic counters, and 4) Client/Server Computer Local Area Network and communication equipment. The visibility sensors are a HSS Model PW 600-120 present weather sensor. The ADVISE VMS were designed with bulb-matrix technology, which are readable at a greater angle and a greater distance than the fiber optic technology used in the freeway VMS. The traffic counters were originally installed at six locations to collect traffic speed and volumes. Currently, only two traffic detection sites are functional. The computer hardware and software was designed to communicate with the

When visibility readings measured by the fog sensors are within certain predefined thresholds (based on safe stopping sight distances) an appropriate message would be displayed on the VMS such as "Dense Fog, Advise 30 mph". The research team had to deal with I-215 restriping, I-15 Reconstruction, lightning strikes to equipment, and accidents that have destroyed some of the traffic detection equipment.

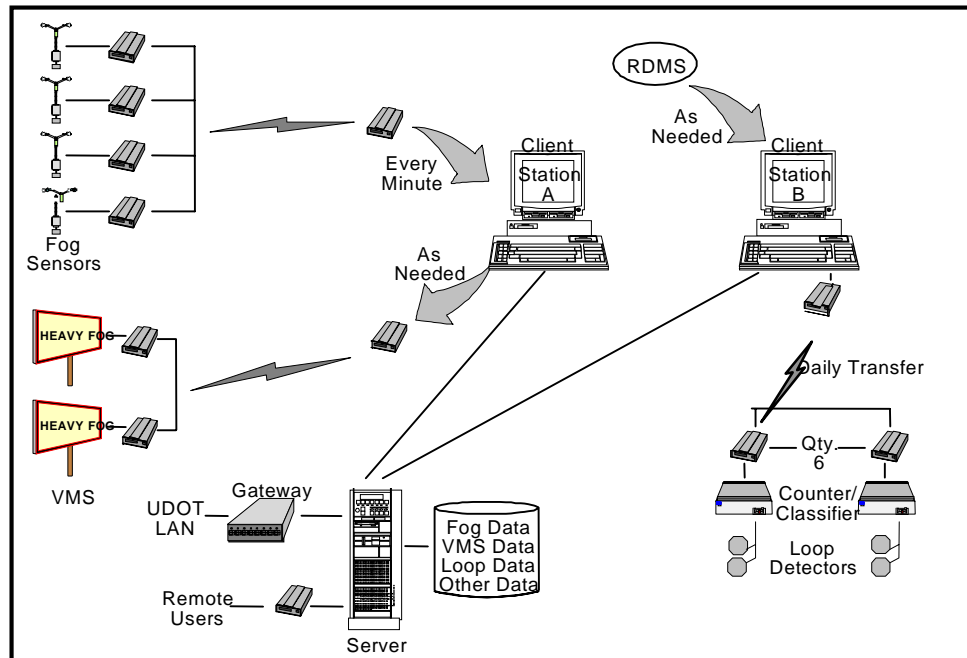
## PROJECT RESULTS & CONCLUSIONS

An evaluation by the University of Utah Traffic Lab has recently been completed and a draft report has been prepared. Data from the 1<sup>st</sup> stage (fog sensors without VMS) and 2<sup>nd</sup> stage (fog sensors with behavior modifying VMS messages) were evaluated and found that the ADVISE

system met one of the project goals which was to reduce the variation of speed under foggy conditions. The system did not reduce the mean speed to the advised speeds.

However, since speed variation reduction is an important factor to reducing the potential for multi-vehicular accidents, it was recommended to incorporate the ADVISE

system into the Advance Traffic Management System (ATMS) and to continue to evaluate the system's effectiveness. A task order is currently being developed to have a consultant integrate the system into Utah's ATMS.



**Original ADVISE System Configuration**

